

PATENT COOPERATION TREATY

PCT


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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

PCT

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference cdk2217	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/GB2005/000640	International filing date (day/month/year) 21.02.2005	Priority date (day/month/year) 20.02.2004	
International Patent Classification (IPC) or national classification and IPC INV. A01N57/34 A01N57/20			
Applicant RHODIA CONSUMER SPECIALTIES LIMITED et al			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 8 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 4 sheets, as follows: <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).			
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application			
Date of submission of the demand 15.12.2005	Date of completion of this report 06.06.2006		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer Lamers, W Telephone No. +31 70 340-3713	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2005/000640

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-8 as originally filed

Claims, Numbers

1-25 filed with telefax on 15.12.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☒ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☒ the claims, Nos. 26-28
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/GB2005/000640

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	4, 5, 7, 10, 11
	No: Claims	1-3, 6, 8, 9, 12-25
Inventive step (IS)	Yes: Claims	10, 11
	No: Claims	1-9, 12-25
Industrial applicability (IA)	Yes: Claims	1-25
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: WO 01/94744 A (T R OIL SERVICES LIMITED; HEATH, STEPHEN, MARK;
BOURNE, HUGH, MALCOLM) 13 December 2001 (2001-12-13)
- D2: EP-A-0 215 562 (ALBRIGHT & WILSON LIMITED) 25 March 1987 (1987-03-25)
- D3: WO 99/17614 A (ALBRIGHT & WILSON UK LIMITED; FIDOE, STEPHEN,
DAVID; IMRIE, CHRISTOPHE) 15 April 1999 (1999-04-15)
- D4: EP-A-0 275 207 (ALBRIGHT & WILSON LIMITED) 20 July 1988 (1988-07-20)
- D5: WO 02/08127 A (RHODIA CONSUMER SPECIALTIES LIMITED; FIDOE,
STEPHEN, DAVID; TALBOT, RO) 31 January 2002 (2002-01-31)

V.a. Certain observations on the international application

V.a.1. The application does not meet the requirements of Article 6 PCT, because claims 1-6, 8, 9, and 12-21 are not clear:

The subject matter of independent claim 1 relates to a phosphonium compound which is "embedded in a matrix substrate", whereby the matrix substrate is defined as having "a melting point of between 5 to 100°C". By this definition also matrix substrates are included, which are liquid at ambient temperatures, which means that the subject matter of claim 1 extends to phosphonium compounds, which are present as either solutions or mixtures/dispersions in a liquid substrate. It follows, that the definition "embedded in a matrix substrate" is clearly not limited to a situation, wherein the compound is firmly enclosed and fixed in a (solid) substrate, but also encloses situations wherein the compound is mixed with or solved in a liquid substrate. Because the meaning of "embedded in a matrix substrate" as used in the claims and in the description therefore appears to be ambiguous, the claims 1-6, 8, 9, and 12-21 are not clear (Art. 6 PCT).

V.a.2. The application does not meet the requirements of Article 6 PCT, because claim 12 is not clear:

The multiple-dependent claim 12 relates to a broad variety of matrix substrates and includes substrates which appear not to match with the physical characteristics as given in claims 1, 6, 7 and 8. For example fatty alcohols und fatty acid alkanolamides are generally known to be hardly water soluble and ordinary salts of alkyl benzene sulfonic acids have melting points clearly exceeding 100°, 70°, or 60°C. These contradictions in the claims and in the description lead to a lack of clarity (Art. 6 PCT).

V.a.3. Claim 22 does not fulfil the requirements of Rule 6.2(a) PCT which does not allow the claims to rely on references to the description.

Claims 23-25 cover a use and methods defined by the term: "substantially as described herein".

If these claims are intended to cover only material already described in claims 1-22, then they do not fulfil the requirements of Art. 6 PCT with respect to conciseness as they are redundant. If, however, they are intended to cover material which has not been described in claims 1-22 then they do not fulfil the requirements of Art. 6 PCT since the scope of the claims is not clear.

Furthermore, if it is intended that these claims should incorporate the description into the claims then they do not fulfil the requirements of Rule 6.2(a) PCT which does not allow the claims to rely on references to the description.

In any case, it is not possible to judge the novelty, inventive step and industrial applicability of the subject-matter of claims 23-25 since it is not clear exactly what is covered by these claims.

V.b. Novelty

The subject matter of claims 1-3, 6, 8, 9, and 12-21 and, as far as understandable, 22-

25 is not new (Art. 33(2) PCT):

Document D2 discloses biocidal mixtures comprising tris hydroxymethyl organophosphine or tetrakis hydroxymethyl phosphonium biocides and surfactants. Surfactants include nonionic ethoxylated compounds, ethylene oxide/propylene oxide copolymers and other surface active agents identical as the ones proposed in claim 12 of the present application (see D2: col. 1, line 1-39; col. 1, line 48 - col. 5, line 24; example 4, trial 5). The compositions may comprise further biocides, scale inhibitors, oxygen scavengers etc. (see D2: col. 6, lines 52 - 58). The relative weight ratios of hydroxyalkyl phosphine compounds and surfactants are in the range of 1:1000 to 1000: 1 and it is emphasized in document D2 that the compositions preferably consist of the two components alone, which means that compositions consisting of mixtures of only biocide and surfactant material are included (see D2: col. 5, lines 50-55; col. 7, lines 4-12; col. 16, line 52 - col. 18, line 4). The compositions are used to treat i.a. industrial water systems. Because in the context of the present application the term "embedded in a matrix substrate" appears to include mixtures of the phosphonium compound and the substrate (see point V.a. above) the subject matter of claims 1-3, 6, 8, 9, 12-20 and 22-25 is not new (Art. 33(2) PCT).

Document D3 discloses solid compositions comprising tris hydroxymethyl organophosphine or tetrakis hydroxymethyl phosphonium biocides which are either coated on solid acids (thus bound to the surface) or absorbed therein, which means that in the latter case the THP biocides are enclosed in the surrounding solid acid substrate (see D3: page 1, paragraph 5). The solid acids have melting points above 50°, preferably above 60° or 70° C. In paragraph 2 on page 2 a list of acids is given, which include water soluble acids (like eg. angelic, lactic or tiglic acid with melting points of 45°, 53° and 63° C). The resulting solid compositions are compacted into various shapes and used (under optional addition of further active ingredients) for treatment of i.a. industrial water systems (see D3: page 1, paragraphs 3 and 5-6; page 2, paragraphs 2 and 6; page 3, paragr. 1-2 and paragraph 6; page 4, paragraph 6). With respect to D3, the subject matter of claims 1-3, 6, 8, 9, and 14-25 is not new (Art. 33(2) PCT).

V.c. Inventive Step

The subject matter of claims 1-9 and 12-25 does not involve an inventive step (Art. 33(3) PCT):

As the subject matter of claims 1-3, 6, 8, 9, and 12-25 is not new, it cannot be considered as involving an inventive step (Art. 33(3) PCT).

The dependent claims 4 and 5 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, because condensates of THP with nitrogen containing compounds are known to the skilled person and have been used for treating industrial water systems (see eg. D5, page 3, lines 15-20). With respect to the teaching of document D3, in particular with view to the solid acid substrates mentioned therein, (angelic, lactic or tiglic acid with melting points of 45°, 53° and 63° C), it is not clear, which technical effect is caused by selecting a matrix substrate having a specific melting point of 60° C. (PEG8000, the matrix substrate used in the examples of the present application has a melting point of 65° C). Dependent claim 7 therefore also lacks an inventive step (Art. 33(3) PCT).

Document D1, which is considered as representing the closest prior art to the subject matter of claims 10 and 11 of the present application, discloses polymeric material for (controlled) releasing chemicals in a fluid environment, whereby the polymeric material forms a matrix, from which the chemical is released (see D1: page 2, lines 19-22; page 4, lines 9-11). Chemicals include scale inhibitors and/or biocides (see D1: page 5, lines 17-19; page 11, lines 5-23; page 12, lines 1-11). Example no. 3 specifies tetrakis hydroxymethyl phosphonium sulfate as biocidal chemical and the compositions of D1 are used to treat industrial fluid systems like oilfield wells. Although polyethylene oxide is mentioned in a long list of polymers, the document teaches that the polymeric material should preferably be permeable and PP/HDPE is used as polymer matrix in example 3 for

the release of tetrakis hydroxymethyl phosphonium sulfate. Therefore D1 suggests, that the product to be delivered is released by permeation.

From this teaching the subject matter of claims 10 and 11 differs in that a water soluble polyethylene glycol with a molecular weight of above 600, in particular polyethylene glycol 8000 is used as matrix substrate. The technical effect brought about by this distinguishing feature is, that the phosphonium compounds can be dosed into systems requiring deaeration without impacting upon the performance of oxygen scavengers while the biocidal performance of the phosphonium compounds is not negatively affected, as proven by the examples. As this distinguishing feature is not suggested by the prior art, the subject matter of claims 10 and 11 involves an inventive step (Art. 33(3) PCT).

V.d. Industrial Applicability

The subject matter of claims 1-21, and, as far as understandable, 22-25 appears to be industrially applicable (Art. 33(4) PCT).

CLAIMS

1. A phosphonium compound embedded in a matrix substrate wherein the phosphonium compound is selected from a group consisting of tris (hydroxyorgano) phosphine (THP), a THP⁺ salt (tetrakis (hydroxyorgano) phosphonium salt) or a condensate of THP and a nitrogen containing compound, and wherein the matrix substrate has a melting point of between 5 to 80° C and is soluble in water at a temperature of between 5 to 100° C.
2. A phosphonium compound as claimed in claim 1, in which the THP⁺ salt is tetrakis (hydroxymethyl) phosphonium sulphate.
3. A phosphonium compound as claimed in claim 1, in which the THP salt is selected from the group consisting of tetrakis (hydroxymethyl) phosphonium chloride, tetrakis (hydroxymethyl) phosphonium phosphate, tetrakis (hydroxymethyl) phosphonium formate, tetrakis (hydroxymethyl) phosphonium acetate and tetrakis (hydroxymethyl) phosphonium oxalate.
4. A phosphonium compound as claimed in any preceding claim, in which the nitrogen containing compound is urea.
5. A phosphonium compound as claimed in any one of claims 1 to 3, in which the nitrogen containing compound is melamine, guanidine or dicyandiamide.
6. A phosphonium compound as claimed in any one of the preceding claims, in which the matrix substrate has a melting point of between 20 to 70° C.

7. A phosphonium compound as claimed in claim 6, in which the matrix substrate has a melting point of 60° C.
8. A phosphonium compound as claimed in any one of the preceding
5 claims, in which the matrix substrate is soluble in water at a temperature of 20° C.
9. A phosphonium compound as claimed in any one of the preceding
10 claims in which the matrix substrate is selected from a polyhydric compound.
10. A phosphonium compound as claimed in claim 9, in which the polyhydric compound is a polyethylene glycol with a molecular weight of above 600.
15
11. A phosphonium compound as claimed in claim 9, in which the polyhydric compound is polyethylene glycol 8000.
12. A phosphonium compound as claimed in any one of claims 1 to 8
20 in which the matrix substrate is selected from a group consisting of ethoxylated surfactants, fatty alcohols, ethoxylated fatty alcohols, ethoxylated alkyl phenols, ethoxylated fatty acids, fatty acid alkanolamides, ethylene oxide/propylene oxide block copolymers, ethoxylated/propoxylated fatty alcohols, polyethylene glycol esters, glycol
25 esters, alkyl benzene sulphonic acids and salts thereof.
13. A phosphonium compound as claimed in any one of the preceding claims, wherein the matrix substrate is a mixture of two or more of the polyhydric compounds defined in any one of claims 10 to 12.
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14. The use of a phosphonium compound as defined in any one of claims 1 to 13 to reduce the numbers of micro-organisms in industrial systems.

5 15. The use of phosphonium compound as claimed in claim 14 in which the industrial system is selected from the group consisting of storage vessels for water and fuel; fuel and gas pipelines; gas lift wells; water injection systems; oil or gas production wells; cooling tower aqueous systems; aqueous systems in paper reduction and the like and any other
10 aqueous systems where micro-organism contamination is a problem.

16. The use of phosphonium compound as claimed in claim 14 or claim 15, in which the micro-organism is selected from the group consisting of sulphate reducing bacteria, general heterotrophic bacteria and algae.

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17. The use of a phosphonium compound as defined in any one of claims 1 to 13 to reduce iron carbonate or iron, lead and zinc scale deposits.

20 18. A method for reducing the numbers of micro-organisms in an industrial system which method comprises a step of contacting the industrial system with an effective amount of phosphonium compound as defined in any one of claims 1 to 13 to reduce the number of micro-organisms.

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19. A method for reducing the amount of scale in an industrial system which method comprises the step of contacting the industrial system with an effective amount of a phosphonium compound defined in any one of claims 1 to 13 to reduce the amount of scale.

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20. A phosphonium compound as claimed in any one of claims 1 to 13,
in which said compound is formulated with one or more of the following:
scale inhibitors, corrosion inhibitors, additional biocides, demulsifiers,
gas hydrate inhibitors, asphaltene inhibitors/dispersants, other
5 surfactants, anti-foams/defoamers, fragrances, wax inhibitors, scale
dissolvers, gelling agents, oxygen scavengers.

21. A phosphonium compound as claimed in any one of claims 1 to 13,
in which said compound is in the form of sticks/candles, beads, pellets,
10 bricks, shavings, flakes or prills.

22. A phosphonium compound substantially as described herein with
reference to the examples.
15

23. The use of a phosphonium compound substantially as described
herein.

24. A method for reducing the numbers of micro-organisms in an
20 industrial system substantially as described herein.

25. A method for reducing the amount of scale in an industrial system
substantially described herein.